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What Is Claimed Is:

1. An image processing apparatus capable of correcting the gradation of image data, comprising:

area discrimination means for discriminating areas to which the image data belong and outputting discrimination results;

coefficient calculation means for outputting correction coefficients to be used for correction of pixel values of the image data based on the discrimination results; and

correction means for correcting the pixel values of the image data with the correction coefficients.

2. An image processing apparatus according to claim 1, wherein said area discrimination means detects a characteristic amount indicative of a characteristic of a predetermined range neighboring to each of the image data and outputting the discrimination result, and said coefficient calculation means outputs the correction coefficients based on the characteristic amounts received from said area discrimination means.

3. An image processing apparatus according to claim 1, wherein said area discrimination means includes a low-pass filter for extracting a low frequency component of each of the image data, and said coefficient

calculation means produces the correction coefficients in response to the low frequency components received from said low-pass filter.

4. An image processing apparatus according to claim 1, wherein said area discrimination means includes quantization means for quantizing the image data, and a low-pass filter for extracting a low frequency component from each of the image data quantized by said quantization means, and said coefficient calculation means produces the correction coefficients in response to the low frequency components received from said low-pass filter.

5. An image processing apparatus according to claim 1, wherein said area discrimination means includes a plurality of low-pass filters for individually extracting low frequency components of each of the image data, and signal composition means for producing single composite signals based on the low frequency components outputted from said low-pass filters, and said coefficient calculation means produces the correction coefficients based on the composite signals received from said signal composition means.

6. An image processing apparatus according to claim 5, wherein said signal composition means weighted

averages the low frequency components outputted from said low-pass filters to produce the composite signals.

7. An image processing apparatus according to claim 5, wherein said signal composition means weighted adds the low frequency components outputted from said low-pass filters with weighting coefficients set in advance to produce the composite signals.

8. An image processing apparatus according to claim 1, wherein said area discrimination means includes a plurality of low-pass filters for individually extracting low frequency components of each of the image data, and said coefficient calculation means includes partial coefficient calculation means for producing coefficients for correction from the low frequency components outputted from said low-pass filters, and coefficient composition means for producing the correction coefficients based on the coefficients for correction.

9. An image processing apparatus according to claim 8, wherein said coefficient composition means weighted averages the coefficients for correction to produce the correction coefficients.

10. An image processing apparatus according to claim 8, wherein said coefficient composition means

weighted adds the coefficients for correction with weighting coefficients set in advance to produce the correction coefficients.

11. An image processing apparatus according to claim 1, wherein said correction means multiplies the pixel values of the image data by the correction coefficients to correct the pixel values of the image data.

12. An image processing apparatus according to claim 1, wherein the number of bits of the image data outputted from said correction means is smaller than the number of bits of the image data inputted to said image processing apparatus.

13. An image processing apparatus according to claim 1, wherein the image data are data obtained by sampling a signal, wherein an amplitude modulated color signal is sequentially superposed on a brightness signal, with a predetermined frequency.

14. An image processing apparatus according to claim 1, wherein the image data are data obtained by sampling a color signal with a predetermined frequency.

15. An image processing apparatus according to claim 1, wherein the image data are data obtained by sampling a brightness signal and a color difference

signal with a predetermined frequency.

16. An image processing method for correcting the gradation of image data, comprising:

an area discrimination step of discriminating areas to which the image data belong and outputting discrimination results;

a coefficient calculation step of outputting correction coefficients to be used for correction of pixel values of the image data based on the discrimination results; and

a correction step of correcting the pixel values of the image data with the correction coefficients.

17. An image processing method according to claim 16, wherein the area discrimination step detects a characteristic amount indicative of a characteristic of a predetermined range neighboring to each of the image data and outputting the discrimination result, and the coefficient calculation step outputs the correction coefficients based on the characteristic amounts.

18. An image processing method according to claim 16, wherein the area discrimination step extracts a low frequency component of each of the image data, and the coefficient calculation step produces the correction coefficients in response to the low frequency components.

19. An image processing method according to claim 16, wherein the area discrimination step includes a quantization step of quantizing the image data, and a step of extracting a low frequency component from each of the image data quantized by the quantization step, and the coefficient calculation step produces the correction coefficients in response to the low frequency components.

20. An image processing method according to claim 16, wherein the area discrimination step includes an extraction step of extracting low frequency components of each of the image data with different frequency bands, and a signal composition step of producing single composite signals based on the low frequency components, and the coefficient calculation step produces the correction coefficients based on the composite signals.

21. An image processing method according to claim 20, wherein the signal composition step weighted averages the low frequency components to produce the composite signals.

22. An image processing method according to claim 20, wherein the signal composition step weighted adds the low frequency components with weighting coefficients set in advance to produce the composite signals.

23. An image processing method according to claim

16, wherein the area discrimination step extracts a plurality of low frequency components of each of the image data with different frequency bands, and the coefficient calculation step includes a partial coefficient calculation step of producing coefficients for correction from the low frequency components, and a coefficient composition step of producing the correction coefficients based on the coefficients for correction.

24. An image processing method according to claim 23, wherein the coefficient composition step weighted averages the coefficients for correction to produce the correction coefficients.

25. An image processing method according to claim 23, wherein the coefficient composition step weighted adds the coefficients for correction with weighting coefficients set in advance to produce the correction coefficients.

26. An image processing method according to claim 16, wherein the correction step multiplies the pixel values of the image data by the correction coefficients to correct the pixel values of the image data.

27. An image processing method according to claim 16, wherein the number of bits of the image data outputted from the correction step is smaller than the

number of bits of the image data inputted.

28. An image processing method according to claim 16, wherein the image data are data obtained by sampling a signal, wherein an amplitude modulated color signal is sequentially superposed on a brightness signal, with a predetermined frequency.

29. An image processing method according to claim 16, wherein the image data are data obtained by sampling a color signal with a predetermined frequency.

30. An image processing method according to claim 16, wherein the image data are data obtained by sampling a brightness signal and a color difference signal with a predetermined frequency.

31. An image processing apparatus capable of correcting the gradation of image data, comprising:

brightness data separation means for separating brightness data and color data from the image data;

area discrimination means for discriminating areas to which the image data belong and outputting discrimination results;

coefficient calculation means for outputting correction coefficients to be used for correction of pixel values of the brightness data based on the discrimination results received from said area

discrimination means; and

correction means for correcting the pixel values of the brightness data and the color data with the correction coefficients.

32. An image processing apparatus according to claim 31, wherein said area discrimination means detects a characteristic amount indicative of a characteristic of a predetermined range neighboring to each of the brightness data and outputting the discrimination result, and said coefficient calculation means outputs the correction coefficients based on the characteristic amounts received from said area discrimination means.

33. An image processing apparatus according to claim 31, wherein said area discrimination means includes a low-pass filter for extracting a low frequency component of each of the brightness data, and said coefficient calculation means produces the correction coefficients in response to the low frequency components received from said low-pass filter.

34. An image processing apparatus according to claim 31, wherein said area discrimination means includes quantization means for quantizing the brightness data, and a low-pass filter for extracting a low frequency component from each of the brightness data quantized by

said quantization means, and said coefficient calculation means produces the correction coefficients in response to the low frequency components received from said low-pass filter.

35. An image processing apparatus according to claim 31, wherein said area discrimination means includes a plurality of low-pass filters for individually extracting low frequency components of each of the brightness data, and signal composition means for producing single composite signals based on the low frequency components outputted from said low-pass filters, and said coefficient calculation means produces the correction coefficients based on the composite signals received from said signal composition means.

36. An image processing apparatus according to claim 35, wherein said signal composition means weighted averages the low frequency components outputted from said low-pass filters to produce the composite signals.

37. An image processing apparatus according to claim 35, wherein said signal composition means weighted adds the low frequency components outputted from said low-pass filters with weighting coefficients set in advance to produce the composite signals.

38. An image processing apparatus according to

claim 31, wherein said area discrimination means includes a plurality of low-pass filters for individually extracting low frequency components of each of the brightness data, and said coefficient calculation means includes partial coefficient calculation means for producing coefficients for correction from the low frequency components outputted from said low-pass filters, and coefficient composition means for producing the correction coefficients based on the coefficients for correction.

39. An image processing apparatus according to claim 38, wherein said coefficient composition means weighted adds the coefficients for correction to produce the correction coefficients.

40. An image processing apparatus according to claim 38, wherein said coefficient composition means weighted adds the coefficients for correction with weighting coefficients set in advance to produce the correction coefficients.

41. An image processing apparatus according to claim 31, wherein said correction means multiplies the pixel values of the brightness data and the color data by the correction coefficients to correct the pixel values of the image data.

42. An image processing apparatus according to claim 31, wherein the number of bits of the brightness data outputted from said correction means is smaller than the number of bits of the image data.

43. An image processing apparatus according to claim 31, wherein the image data are data obtained by sampling a signal, wherein the amplitude modulated color signal is sequentially superposed on the brightness signal, with a predetermined frequency.

44. An image processing method for correcting the gradation of image data, comprising:

a brightness data separation step of separating brightness data and color data from the image data;

an area discrimination step of discriminating areas to which the image data belong and outputting discrimination results;

a coefficient calculation step of outputting correction coefficients to be used for correction of pixel values of the brightness data based on the discrimination results; and

a correction step of correcting the pixel values of the brightness data and the color data with the correction coefficients.

45. An image processing method according to claim

44, wherein the area discrimination step detects a characteristic amount indicative of a characteristic of a predetermined range neighboring to each of the brightness data and outputting the discrimination result, and the coefficient calculation step outputs the correction coefficients based on the characteristic amounts.

46. An image processing method according to claim 44, wherein the area discrimination step extracts a low frequency component of each of the brightness data, and the coefficient calculation step produces the correction coefficients in response to the low frequency components.

47. An image processing method according to claim 44, wherein the area discrimination step includes a quantization step of quantizing the brightness data, and a step of extracting a low frequency component from each of the brightness data quantized by the quantization step, and the coefficient calculation step produces the correction coefficients in response to the low frequency components.

48. An image processing method according to claim 44, wherein the area discrimination step includes an extraction step of extracting a plurality of low frequency components of each of the brightness data with different frequency bands, and a signal composition step

of producing single composite signals based on the low frequency components, and the coefficient calculation step produces the correction coefficients based on the composite signals.

49. An image processing method according to claim 48, wherein the signal composition step weighted averages the low frequency components to produce the composite signals.

50. An image processing method according to claim 48, wherein the signal composition step weighted adds the low frequency components with weighting coefficients set in advance to produce the composite signals.

51. An image processing method according to claim 44, wherein the area discrimination step extracts a plurality of low frequency components of each of the brightness data with different frequency bands, and the coefficient calculation step includes a partial coefficient calculation step of producing coefficients for correction from the low frequency components, and a coefficient composition step of producing the correction coefficients based on the coefficients for correction.

52. An image processing method according to claim 51, wherein the coefficient composition step weighted averages the coefficients for correction to produce the

correction coefficients.

53. An image processing method according to claim 51, wherein the coefficient composition step weighted adds the coefficients for correction with weighting coefficients set in advance to produce the correction coefficients.

54. An image processing method according to claim 44, wherein the correction step multiplies the pixel values of the brightness data and the color data by the correction coefficients to correct the pixel values of the image data.

55. An image processing method according to claim 44, wherein the number of bits of the brightness data obtained from the correction step is smaller than the number of bits of the image data.

56. An image processing method according to claim 44, wherein the image data are data obtained by sampling a signal, wherein the amplitude modulated color signal is sequentially superposed on the brightness signal, with a predetermined frequency.

57. An image processing apparatus capable of correcting the gradation of image data formed from a brightness signal and a color signal sequentially superposed on the brightness signal in a time divisional

relationship, comprising:

characteristic amount detection means for successively detecting a characteristic amount indicative of a predetermined range neighboring to each of pixels of the image data;

area discrimination means for discriminating areas to which the image data belong based on the characteristic amounts and outputting discrimination results;

coefficient calculation means for outputting correction coefficients to be used for correction of the pixel values of the image data based on the discrimination results; and

correction means for correcting the pixel values of the image data with the correction coefficients.

58. An image processing apparatus according to claim 57, wherein said characteristic amount detection means successively detects a maximum value of the pixel values in the predetermined neighboring range as the characteristic amount.

59. An image processing apparatus according to claim 57, wherein said characteristic amount detection means successively detects a minimum value of the pixel values in the predetermined neighboring range as the

characteristic amount.

60. An image processing apparatus according to claim 57, wherein said characteristic amount detection means successively detects a maximum value and a minimum value of the pixel values in the predetermined neighboring range and detects the characteristic amount based on the maximum value and the minimum value.

61. An image processing apparatus according to claim 57, wherein said characteristic amount detection means successively detects a maximum value and a minimum value of the pixel values in the predetermined neighboring range and composes the maximum value and the minimum value in response to an average value of the image data to detect the characteristic amount.

62. An image processing apparatus according to claim 57, wherein said area discrimination means includes a low-pass filter for extracting a low frequency component of each of the characteristic amounts, and said coefficient calculation means produces the correction coefficients in response to the low frequency components received from said low-pass filter.

63. An image processing apparatus according to claim 57, wherein said area discrimination means includes quantization means for quantizing the characteristic

amounts, and a low-pass filter for extracting a low frequency component from each of the characteristic amounts quantized by said quantization means, and said coefficient calculation means produces the correction coefficients in response to the low frequency components received from said low-pass filter.

64. An image processing apparatus according to claim 57, wherein said area discrimination means includes a plurality of low-pass filters for individually extracting low frequency components of each of the characteristic amounts, and signal composition means for producing single composite signals based on the low frequency components outputted from said low-pass filters, and said coefficient calculation means produces the correction coefficients based on the composite signals received from said signal composition means.

65. An image processing apparatus according to claim 64, wherein said signal composition means weighted averages the low frequency components outputted from said low-pass filters to produce the composite signals.

66. An image processing apparatus according to claim 57, wherein said signal composition means weighted adds the low frequency components outputted from said low-pass filters with weighting coefficients set in

advance to produce the composite signals.

67. An image processing apparatus according to claim 57, wherein said area discrimination means includes a plurality of low-pass filters for individually extracting low frequency components of each of the characteristic amounts, and said coefficient calculation means includes partial coefficient calculation means for producing coefficients for correction from the low frequency components outputted from said low-pass filters, and coefficient composition means for producing the correction coefficients based on the coefficients for correction.

68. An image processing apparatus according to claim 67, wherein said coefficient composition means weighted averages the coefficients for correction to produce the correction coefficients.

69. An image processing apparatus according to claim 67, wherein said coefficient composition means weighted adds the coefficients for correction with weighting coefficients set in advance to produce the correction coefficients.

70. An image processing apparatus according to claim 57, wherein said correction means multiplies the pixel values of the image data by the correction

coefficients to correct the pixel values of the image data.

71. An image processing apparatus according to claim 57, wherein the number of bits of the image data outputted from said correction means is smaller than the number of bits of the image data inputted to said characteristic amount detection means.

72. An image processing method for correcting the gradation of image data formed from a brightness signal and a color signal sequentially superposed on the brightness signal in a time divisional relationship, comprising:

a characteristic amount detection step of successively detecting a characteristic amount indicative of a predetermined range neighboring to each of pixels of the image data;

an area discrimination step of discriminating areas to which the image data belong based on the characteristic amounts and outputting discrimination results;

a coefficient calculation step of outputting correction coefficients to be used for correction of the pixel values of the image data based on the discrimination results; and

a correction step of correcting the pixel values of the image data with the correction coefficients.

73. An image processing method according to claim 72, wherein the characteristic amount detection step successively detects a maximum value of the pixel values in the predetermined neighboring range as the characteristic amount.

74. An image processing method according to claim 72, wherein the characteristic amount detection step successively detects a minimum value of the pixel values in the predetermined neighboring range as the characteristic amount.

75. An image processing method according to claim 72, wherein the characteristic amount detection step successively detects a maximum value and a minimum value of the pixel values in the predetermined neighboring range and detects the characteristic amount based on the maximum value and the minimum value.

76. An image processing method according to claim 72, wherein the characteristic amount detection step successively detects a maximum value and a minimum value of the pixel values in the predetermined neighboring range and composes the maximum value and the minimum value in response to an average value of the image data

to detect the characteristic amount.

77. An image processing method according to claim 72, wherein the area discrimination step extracts a low frequency component of each of the characteristic amounts, and the coefficient calculation step produces the correction coefficients in response to the low frequency components.

78. An image processing method according to claim 72, wherein the area discrimination step quantizes the characteristic amounts and extracts a low frequency component from each of the characteristic amounts quantized by the quantization, and the coefficient calculation step produces the correction coefficients in response to the low frequency components.

79. An image processing method according to claim 72, wherein the area discrimination step includes a signal extraction step of extracting a plurality of low frequency components of each of the characteristic amounts with different frequency bands, and a signal composition step of producing single composite signals based on the low frequency components, and the coefficient calculation step produces the correction coefficients based on the composite signals.

80. An image processing method according to claim

79, wherein the signal composition step weighted averages the low frequency components to produce the composite signals.

81. An image processing method according to claim 79, wherein the signal composition step weighted adds the low frequency components with weighting coefficients set in advance to produce the composite signals.

82. An image processing method according to claim 72, wherein the area discrimination step extracts a plurality of low frequency components of each of the characteristic amounts with different frequency bands, and the coefficient calculation step includes a partial coefficient calculation step of producing coefficients for correction from the low frequency components, and a coefficient composition step of producing the correction coefficients based on the coefficients for correction.

83. An image processing method according to claim 82, wherein the coefficient composition step weighted averages the coefficients for correction to produce the correction coefficients.

84. An image processing method according to claim 82, wherein the coefficient composition step weighted adds the coefficients for correction with weighting coefficients set in advance to produce the correction

coefficients.

85. An image processing method according to claim 72, wherein the correction step multiplies the pixel values of the image data by the correction coefficients to correct the pixel values of the image data.

86. An image processing method according to claim 72, wherein the number of bits of the image data outputted from the correction step is smaller than the number of bits of the image data inputted.

87. An image processing apparatus capable of correcting the gradation of image data, comprising:

area discrimination means for discriminating areas to which the image data belong and outputting discrimination results;

coefficient calculation means for outputting correction coefficients to be used for correction of pixel values of the image data based on the discrimination results; and

correction means for correcting the pixel values of the image data with the correction coefficients;

said area discrimination means or said coefficient calculation means producing the discrimination results or the correction coefficients such that the resolution of the correction coefficients may be switched in response

the pixel values of the image data.

88. An image processing apparatus according to claim 87, wherein said area discrimination means or said coefficient calculation means produces the discrimination results or the correction coefficients such that the resolution of the correction coefficients decreases as the variation of an output value with respect to a variation of an input value in an input/output characteristic of said correction means with regard to the image data decreases.

89. An image processing apparatus according to claim 87, wherein said area discrimination means detects a characteristic amount indicative of a characteristic of a predetermined range neighboring to each of the image data and outputting the discrimination result, and said coefficient calculation means outputs the correction coefficients based on the characteristic amounts received from said area discrimination means.

90. An image processing apparatus according to claim 87, wherein said area discrimination means varies the resolution of the discrimination results in response to the pixel values of the image data to switch the resolution of the correction coefficients.

91. An image processing apparatus according to

claim 87, wherein said coefficient calculation means corrects the correction coefficients in response to the pixel values of the image data to switch the resolution of the correction coefficients.

92. An image processing apparatus according to claim 87, wherein said area discrimination means includes a low-pass filter for extracting a low frequency component of each of the image data and outputting the discrimination result.

93. An image processing apparatus according to claim 87, wherein said area discrimination means includes a plurality of low-pass filters having different pass-band widths for individually extracting low frequency components of each of the image data, and signal composition means for composing the low frequency components outputted from said low-pass filters to produce the discrimination results.

94. An image processing apparatus according to claim 93, wherein said signal composition means weighted averages the low frequency components outputted from said low-pass filters to produce the discrimination results.

95. An image processing apparatus according to claim 87, wherein said area discrimination means includes a plurality of low-pass filters for individually

extracting low frequency components of each of the image data and outputting the discrimination results, and said coefficient calculation means includes partial coefficient calculation means for producing coefficients for correction from the low frequency components outputted from said low-pass filters, and coefficient composition means for producing the correction coefficients based on the coefficients for correction.

96. An image processing apparatus according to claim 95, wherein said coefficient composition means composes the coefficients for correction in response to the image data to produce the correction coefficients.

97. An image processing apparatus according to claim 95, wherein said coefficient composition means weighted averages the coefficients for correction in response to the image data to produce the correction coefficients.

98. An image processing apparatus according to claim 87, wherein said correction means multiplies the pixel values of the image data by the correction coefficients to correct the pixel values of the image data.

99. An image processing apparatus according to claim 87, wherein the number of bits of the image data

outputted from said correction means is smaller than the number of bits of the image data inputted to said image processing apparatus.

100. An image processing apparatus according to claim 87, wherein the image data are data obtained by sampling a signal, wherein an amplitude modulated color signal is sequentially superposed on a brightness signal in a time divisional relationship, with a predetermined frequency.

101. An image processing apparatus according to claim 87, wherein the image data are data obtained by sampling a brightness signal and a color difference signal with a predetermined frequency.

102. An image processing method for correcting the gradation of image data, comprising:

an area discrimination step of discriminating areas to which the image data belong and outputting discrimination results;

a coefficient calculation step of outputting correction coefficients to be used for correction of pixel values of the image data based on the discrimination results; and

a correction step of correcting the pixel values of the image data with the correction coefficients;

the area discrimination step or the coefficient calculation step producing the discrimination results or the correction coefficients such that the resolution of the correction coefficients may be switched in response the pixel values of the image data.

103. An image processing method according to claim 102, wherein the area discrimination step or the coefficient calculation step produces the discrimination results or the correction coefficients such that the resolution of the correction coefficients decreases as the variation of an output value with respect to a variation of an input value in an input/output characteristic of the correction step with regard to the image data decreases.

104. An image processing method according to claim 102, wherein the area discrimination step detects a characteristic amount indicative of a characteristic of a predetermined range neighboring to each of the image data and outputting the discrimination result, and the coefficient calculation step outputs the correction coefficients based on the characteristic amounts.

105. An image processing method according to claim 102, wherein the area discrimination step varies the resolution of the discrimination results in response to

the pixel values of the image data to switch the resolution of the correction coefficients.

106. An image processing method according to claim 102, wherein the area discrimination step corrects the correction coefficients in response to the pixel values of the image data to switch the resolution of the correction coefficients.

107. An image processing method according to claim 102, wherein the area discrimination step extracts a low frequency component of each of the image data and outputs the discrimination result.

108. An image processing method according to claim 102, wherein the area discrimination step includes a signal extraction step of extracting a plurality of low frequency components of each of the image data with different pass-band widths, and a signal composition step of composing the low frequency components to produce the discrimination results.

109. An image processing method according to claim 108, wherein the signal composition step weighted averages the low frequency components to produce the discrimination results.

110. An image processing method according to claim 102, wherein the area discrimination step extracts a

plurality of low frequency components of each of the image data with different pass-band widths and outputs the discrimination results, and the coefficient calculation step includes a partial coefficient calculation step of producing coefficients for correction from the low frequency components, and a coefficient composition step of producing the correction coefficients based on the coefficients for correction.

111. An image processing method according to claim 110, wherein the coefficient composition step composes the coefficients for correction in response to the image data to produce the correction coefficients.

112. An image processing method according to claim 110, wherein the coefficient composition step weighted averages the coefficients for correction in response to the image data to produce the correction coefficients.

113. An image processing method according to claim 102, wherein the correction step multiplies the pixel values of the image data by the correction coefficients to correct the pixel values of the image data.

114. An image processing method according to claim 102, wherein the number of bits of the image data obtained by the correction step is smaller than the number of bits of the image data inputted.

115. An image processing method according to claim 102, wherein the image data are data obtained by sampling a signal, wherein an amplitude modulated color signal is sequentially superposed on a brightness signal in a time divisional relationship, with a predetermined frequency.

116. An image processing method according to claim 102, wherein the image data are data obtained by sampling a brightness signal and a color difference signal with a predetermined frequency.